11:16:38 OCA PAD AMENDMENT - PROJECT HEADER INFORMATION 02/26/93

Active

Project #: E-24-682 Cost share #: Rev #: 3
Center # : 10/24-6-R7528-0A0 Center shr #: OCA file #:
Work type : RES
Contract#: DDM-9296162 Mod #: SUB P. E-25-X84 Document : GRANT
Prime #: Contract entity: GTRC

Subprojects ? : Y CFDA: 47.049
Main project #: PE #: N/A

Project unit: ISYE Unit code: 02.010.124
Project director(s):
LOHMANN J R ENGR COLL (404)894-3355

Sponsor/division names: NATL SCIENCE FOUNDATION / GENERAL
Sponsor/division codes: 107 / 000

Award period: 911101 to 930831 (performance) 931130 (reports)

Sponsor amount	New this change	Total to date
Contract value	0.00	32,835.00
Funded	0.00	32,835.00
Cost sharing amount		0.00

Does subcontracting plan apply ?: N

Title: PYI - TRANSFER

PROJECT ADMINISTRATION DATA

OCA contact: Jacquelyn L. Tyndall 894-4820

Sponsor technical contact

DR. SUREN RAO
(000)000-0000

NATIONAL SCIENCE FOUNDATION
1800 G STREET, NW
WASHINGTON, DC 20550

Sponsor issuing office

H. D. WOLFF, III
(000)000-0000

NATIONAL SCIENCE FOUNDATION
1800 G STREET, NW
WASHINGTON, DC 20550

Security class (U,C,S,TS) : U ONR resident rep. is ACO (Y/N): N
Defense priority rating : N/A NSF supplemental sheet
Equipment title vests with: Sponsor GIT X

Administrative comments -
ISSUED TO ESTABLISH SUBPROJECT E-25-X84.

GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION

NOTICE OF PROJECT CLOSEOUT

Closeout Notice Date 09/20/93

Project No. E-24-682_____ Center No. 10/24-6-R7528-0A0_

Project Director LOHMANN J R_____ School/Lab ISYE_____

Sponsor NATL SCIENCE FOUNDATION/GENERAL_____

Contract/Grant No. DDM-9296162_____ Contract Entity GTRC

Prime Contract No. _____

Title PYI - TRANSFER_____

Effective Completion Date 930831 (Performance) 931130 (Reports)

Closeout Actions Required:	Y/N	Date Submitted
Final Invoice or Copy of Final Invoice	Y	_____
Final Report of Inventions and/or Subcontracts	N	_____
Government Property Inventory & Related Certificate	N	_____
Classified Material Certificate	N	_____
Release and Assignment	N	_____
Other _____	N	_____

CommentsEFFECTIVE DATE 11-1-91. CONTRACT VALUE $32,835._____

Subproject Under Main Project No. _____

Continues Project No. _____

Distribution Required:

Project Director	Y
Administrative Network Representative	Y
GTRI Accounting/Grants and Contracts	Y
Procurement/Supply Services	Y
Research Property Managment	Y
Research Security Services	N
Reports Coordinator (OCA)	Y
GTRC	Y
Project File	Y
Other CARL BAXTER-FMD_____	Y
FRED CAIN-OOD_____	N

GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION

NOTICE OF PROJECT CLOSEOUT (SUBPROJECTS)

Closeout Notice Date 09/20/93

Project No. E-24-682 Center No. 10/24-6-R7528-0A0_

Project Director LOHMANN J R_____ School/Lab ISYE_____

Sponsor NATL SCIENCE FOUNDATION/GENERAL_____

Project # E-25-X84 PD JETER S M Unit 02.010.126 T
GRANT # DDM-9296162 MOD# ADM. REVISION MECH ENGR *
Ctr # 10/24-6-R7528-0A1 Main proj # E-24-682 OCA CO JLT
Sponsor-NATL SCIENCE FOUNDAT /GENERAL 107/000
PYI - TRANSFER
Start 930101 End 930831 Funded 6,920.00 Contract 6,920.00

LEGEND
1. * indicates the project is a subproject.
2. I indicates the project is active and being updated.
3. A indicates the project is currently active.
4. T indicates the project has been terminated.
5. R indicates a terminated project that is being modified.

OMB Number 3145-0058

NATIONAL SCIENCE FOUNDATION
1800 G STREET, NW
WASHINGTON, DC 20550

BULK RATE
POSTAGE & FEES PAID
National Science Foundation
Permit No. G-[illegible]

PI/PD Name and Address

Jack R. Lohmann
College of ENgineering
~~GA Tech Res Corp~~
Atlanta GA 30332

NATIONAL SCIENCE FOUNDATION
FINAL PROJECT REPORT

PART I - PROJECT IDENTIFICATION INFORMATION

1. Program Official/Org. F. Hank Grant - DDM

2. Program Name MANUFACTURING PROCESSES & EQUIPMENT PROG

3. Award Dates (MM/YY) From: 11/91 To: 08/93

4. Institution and Address

~~GA Tech Res Corp~~
Administration Building
Atlanta GA 30332

5. Award Number 9296162

6. Project Title

Presidential Young Investigator Award: Economic Replacement of Evolving Manufacturing Technology

This Packet Contains
NSF Form 98A
And 1 Return Envelope

PART IV -- FINAL PROJECT REPORT -- SUMMARY DATA ON PROJECT PERSONNEL

(To be submitted to cognizant Program Officer upon completion of project)

The data requested below are important for the development of a statistical profile on the personnel supported by Federal grants. The information on this part is solicited in resonse to Public Law 99-383 and 42 USC 1885C. All information provided will be treated as confidential and will be safeguarded in accordance with the provisions of the Privacy Act of 1974. You should submit a single copy of this part with each final project report. However, submission of the requested information is not mandatory and is not a precondition of future award(s). Check the "Decline to Provide Information" box below if you do not wish to provide the nformation.

Please enter the numbers of individuals supported under this grant.
Do not enter information for individuals working less than 40 hours in any calendar year.

	Senior Staff		Post-Doctorals		Graduate Students		Under-Graduates		Other Participants[1]	
	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.
A. Total, U.S. Citizens	3				9	2				
B. Total, Permanent Residents					4					
U.S. Citizens or Permanent Residents[2]:										
American Indian or Alaskan Native										
Asian										
Black, Not of Hispanic Origin										
Hispanic										
Pacific Islander										
White, Not of Hispanic Origin										
C. Total, Other Non-U.S. Citizens										
Specify Country 1.										
2.										
3.										
D. Total, All participants (A + B + C)	3				13	2				
Disabled[3]										

☐ Decline to Provide Information: Check box if you do not wish to provide this information (you are still required to return this page along with Parts I-III).

[1] Category includes, for example, college and precollege teachers, conference and workshop participants.

[2] Use the category that best describes the ethnic/racial status fo all U.S. Citizens and Non-citizens with Permanent Residency. *(If more than one category applies, use the one category that most closely reflects the person's recognition in the community.)*

[3] A person having a physical or mental impairment that substantially limits one or more major life activities; who has a record of such impairment; or who is regarded as having such impairment. *(Disabled individuals also should be counted under the appropriate ethnic/racial group unless they are classified as "Other Non-U.S. Citizens.")*

AMERICAN INDIAN OR ALASKAN NATIVE: A person having origins in any of the original peoples of North America and who maintains cultural identification through tribal affiliation or community recognition.

ASIAN: A person having origins in any of the original peoples of East Asia, Southeast Asia or the Indian subcontinent. This area includes, for example, China, India, Indonesia, Japan, Korea and Vietnam.

BLACK, NOT OF HISPANIC ORIGIN: A person having origins in any of the black racial groups of Africa.

HISPANIC: A person of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish culture or origin, regardless of race.

PACIFIC ISLANDER: A person having origins in any of the original peoples of Hawaii; the U.S. Pacific territories of Guam, American Samoa, and the Northern Marinas; the U.S. Trust Territory of Palau; the islands of Micronesia and Melanesia; or the Philippines.

WHITE, NOT OF HISPANIC ORIGIN: A person having origins in any of the original peoples of Europe, North Africa, or the Middle East.

Attachment to

NSF Form 98A
Final Project Report

P.I.: Jack R. Lohmann
Award Number: DDM-9296162
Project Title: Presidential Young Investigator Award -
Economic Replacement of Evolving Manufacturing Technology

Part II

The primary objective of this project was the development and application of economic replacement methodologies for evolving technologies. Methodologies employed included dynamic programming, computer simulation, Lagrangian relaxaxtion methods, and branch-and-bound algorithms. Among the decision making environments treated were finite or infinite horizons, deterministic or stochastic consequences, serial or parallel asset replacement, optimal or near-optimal (error-bounded) economic replacement, turnpike strategies, capital rationing constraints, and the effects of recent tax policy on replacement decision making. Related investigations included the effectiveness of capital budgeting decision criteria and investment decision models, and the clarification of fundamental principles and underlying assumptions related to key economic decision criteria and their application. Fifteen publications, including five doctoral dissertations, and a dozen national and international presentations disseminated the results. The research supported fifteen graduate students and three senior personnel. Industrial sponsors of the research include AT&T, General Motors, and IBM.

Part III

PUBLICATIONS

1. Bean, J.C., J.R. Lohmann, R.L. Smith, "Equipment Replacement Under Technological Change," accepted to appear in *Naval Research Logistics*, June 1993, pg. 15.

2. Karabakal, N., J.R. Lohmann, and J.C. Bean, "Parallel Replacement Under Capital Rationing Constraints," accepted to appear in *Management Science*, December, 1992, 33 pg.

3. Karabakal, J.C. Bean, and J.R. Lohmann, "A Steepest Decent Multiplier Adjustment Method for the Generalized Assignment Problem," accepted to appear in *Operations Research*, October, 1992.

4. Karabakal, J.C. Bean, and J.R. Lohmann, "A Multiplier Adjustment-Based Code for the Generalized Assignment Problem," submitted to *Operations Research Letters*, June, 1992, 13 pg.

5. Baksh, S.N., and J.R. Lohmann, "The IRR, NPV and Payback Period and Their Relative Performance in Common Capital Budgeting Decision Procedures for Dealing with Risk," accepted to appear in *The Engineering Economist*, August, 1993, 34 pg.

6. Lohmann, J.R., and R.V. Oakford, "AnMod and DecSim: Two Models of Sequences of Capital Rationing Decisions and Their Usefulness in Theory and Practice," submitted to *The Engineering Economist*, September, 1993, 27 pg.

7. Lohmann, J.R., "The NPV, IRR and the Fallacy of the Reinvestment Rate Assumptions," *The Engineering Economist*, 33 (Summer 1988) 4, pp. 303-330.

8. Lohmann, J.R., "A Stochastic Replacement Economy Decision Model," *IIE Transactions*, 18 (June 1986) 2, pp. 182-194.

9. Bean, J.C., J.R. Lohmann, and R.L. Smith, "The Equivalent Finite Horizon and Error-Bounded Equivalent Finite Horizon for Infinite Horizon Replacment Problems," *Stream A: Theoretical Approaches, 4th International Working Seminar on Production Economics*, Igls, Austria, pp. 1-17, February, 1986.

10. Bean, J.C., J.R. Lohmann, and R.L. Smith, "A Dynamic Infinite Horizon Replacement Economy Decision Model," *The Engineering Economist*, 30 (Winter 1985) 2, pp. 99-120.

11. M. Brown, "A Utility Maximization Replacement Economy Decision Model," Ph.D. Dissertation, Department of Industrial and Operations Engineering, University of Michigan, Ann Arbor, Michigan, 1991.

12. N. Karabakal, "The Capital Rationing Replacement Economy Problem," Ph.D. Dissertation, Department of Industrial and Operations Engineering, University of Michigan, Ann Arbor, Michigan, 1991.

13. G. Kothrandaraman, "Serial Replacement Under Evolving Productivity," Ph.D. Dissertation, Department of Industrial and Operations Engineering, University of Michigan, Ann Arbor, Michigan, 1987.

14. S. Baksh, "Effectiveness of Capital Budgeting Procedures for Dealing with Risk," Ph.D. Dissertation, Department of Industrial and Operations Engineering, University of Michigan, Ann Arbor, Michigan, 1986.

15. D. Vander Veen, "Parallel Replacement Under Nonstationary Deterministic Demand," Ph.D. Dissertation, Department of Industrial and Operations Engineering, University of Michigan, Ann Arbor, Michigan, 1985.

PRESENTATIONS

1. Karabakal, N., J.R. Lohmann, and J.C. Bean "Parallel Replacement Under Capital Rationing Constraints," TIMS/ORSA Conference, Chicago, Il., Many 1993.

2. Bean, J.C., J.R. Lohmann, and R.L. Smith, "Infinite Horizon Manufacturing Replacement with Evolving Technology," Manufacturing Research Forum, School of Business Administration, University of Michigan, September, 1988.

3. Bean, J.C., J.R. Lohmann, and R.L. Smith, "Error-Bounded Equipment Replacement with Technological Change," TIMS/ORSA Conference, St. Louis, Mo., October, 1987.

4. Lohmann, J.R., "Infinite Horizon Replacement with Error-Bounds," GM Research Laboratories, Warren, Mi., August, 1987.

5. Lohmann, J.R., "Research in Replacement Economics with Evolving Technology," Department of Industrial and Systems Engineering, University of Southern California, Los Angeles, Ca., Decemeber, 1985.

6. Lohmann, J.R., "Research in Replacement Economics with Evolving Technology," Département de Sociales Economiques, Sciences et Humaines, Ecole Centrale , Paris, France, March, 1986.

7. Lohmann, J.R., "Research in Replacement Economics with Evolving Technology," Department of Management and Economics, Linkoping Institute of Technology, Linkoping, Sweden, May, 1986.

8. Lohmann, J.R., "Research in Replacement Economics with Evolving Technology," Institute of Production Management and Industrial Engineering, The Technical University of Denmark, Lynby, Denmark, May, 1986.

9. Lohmann, J.R., "Engineering Economics Seminar Series," Département de Sociales Economiques, Sciences et Humaines, Ecole Centrale, Paris, France, February - March, 1986.

10. Bean, J.C., J.R. Lohmann, and R.L. Smith, "The Equivalent Finite Horizon and Error-Bounded Equivalent Finite Horizon for Infinite Horizon Replacment Problems," 4th International Working Seminar on Production Economics, Igls, Austria, February, 1986.

11. Lohmann, J.R., "Research Directions in Replacement Economics," National Science Foundation, Research Planning Conference on Engineering Economics, Blacksburg, Va., August, 1984.

12. Lohmann, J.R., "Replacement Economics and Computer Automation Technology," International Computers and Engineering Conference, American Society of Mechanical Engineers, Las Vegas, Nv., August, 1984.